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THIS MATERIAL CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAW, TITLE 18, U.S.C., SECTIONS 793 AND 794, THE TRANSMISSION OR REVELATION OF WHICH IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

Declass Review by NIMA/DOD

September 10, 1964

Full
11-6-64
EPX

I. Introduction

This is the second monthly status report of the work performed on Project 36. It covers the period from August 5 to September 9, 1964.

The objective of this project is to study methods for obtaining a modulated light film viewing system.

II. Progress in the last period.

A photomultiplier pickup assembly, feedback amplifier, and phosphor lag correction amplifier were completed and installed in the modified projection television receiver (model 741 PCS). The equipment was set up to project a raster of about 15 x 12 inches, onto an opal glass screen. The transmitted raster brightness was about 30 ft. lamberts. A test pattern transparency was laid over the screen.

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With negative feedback signal applied, a defocussed inverse image can be seen on the back of the screen. The amount of modulation obtainable before system oscillation was about 50 percent. Several projection kinescopes having different phosphors were tested to evaluate the effects of different phosphor decay times on system oscillation.

The following conclusions have been drawn:

- a. The standard television 60 cps scanning rate gives no flicker at the illumination level used.
- b. A diffusing screen is essential for a projection system.

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- c. More than 50 percent modulation is required. At this level of modulation, some beneficial effects, such as reduction of corner shading from vignetting, and slightly reduced overall contrast are obtained, but not to the degree desired.
- d. The P4 white phosphor commonly used in television picture tubes, and having a medium persistence (7 percent brightness after 33 milliseconds) is too slow. Phosphors P16 (violet and ultra-violet) and P24 (pale green) are satisfactory in speed, but are unacceptable because of color, though P24 is usable.
- e. A spot size of about 0.1 inch seems appropriate for producing an "unsharp mask effect". (This conclusion is not firm).

Attempts were made to operate with the photomultiplier on the illuminated rather than the viewing side of the diffusing screen. Semi-transparent mirrors ranging from 25 to 75 percent transmission were laid over the transparency being viewed to reflect back a portion of the light to the pickup. No successful results were obtained. The experiments will be repeated after system operation has been improved.

The mechanical scan approach has been tentatively rejected because of modulator problems, and low effective aperture. Use of photochromic materials is still being studied.

25X1A [REDACTED] on Sept. 9. The equipment was demonstrated to him, and progress and plans were discussed.

25X1A [REDACTED] pointed out that the purpose of the equipment to be developed is primarily to aid in observing small indistinct features in photographs, and that this objective should guide choices of procedures and techniques.

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III. Problem Areas

The system oscillation has been troublesome as it prevents obtaining sufficient modulation of the illuminating light. The cause of the oscillations is being sought.

IV. Projected work for the next period

- a. Attempts will be made to increase the brightness of the display in the projection television equipment. This might be done by using a larger higher-powered tube, or overdriving the smaller ones for brief periods.
- b. A kinescope having a dual phosphor (P4 for proper color and P16 for fast decay) will be constructed. There are no severe problems foreseen in construction of such a tube. One has not been made previously because the need has not existed.
- c. Direct rather than projection illumination by a kinescope will be experimentally evaluated using the tubes on hand. A larger flat-faced kinescope will be ordered (perhaps with the dual phosphor mentioned above) if this method looks promising. The problems of a synchronized television camera pickup for detail sensing with this mode of illumination will be studied.

V. Financial status

Funds expended through August 1964.

July
Aug.



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Projected expenditures.

Sept.

Oct.

Nov.

Dec.

Jan.



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The above figures are preliminary and do not represent a final accounting.

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File 11-6-64
RPT RPT

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October 9, 1964

I. Introduction

This is the third monthly status report of the work performed on Project 36. It covers the period from September 9 to October 9, 1964.

The objective of this project is to study methods for obtaining a modulated-light film viewing system.

II. Progress in the last period.

A special 5 inch kinescope tube was ordered and received from [REDACTED]. This tube has a phosphor which is a mixture of P16 and the yellow component of P4 (silicate type) phosphors. The visible color is a somewhat yellowish-white. The tube is available for experiments either with the projection system, or direct viewing. Maximum light output is slightly over 1000 foot-lamberts, when used in the direct view mode.

High frequency instabilities were eliminated, and tests made of the effectiveness of the feedback operation using aerial photos, and a pattern of neutral density filters. High-light brightness was reduced by a factor of about 20, with transmitted light constant within a factor of two for a density range from 0 to 1.3. There was however no increase in light transmitted through the denser areas, which is desirable. This condition can be corrected readily by employing a different method for biasing the kinescope. A [REDACTED] 7-51 UV transmittance filter is placed over the photomultiplier, so that it sees only the fast P16 component of the phosphor. The system is operable in a fully lighted room.

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In the direct view mode, a diffuser must be placed directly under the film to eliminate parallax effects resulting from the finite thickness of the kinescope faceplate. The use of a diffuser results in a defocussed illuminating spot which is satisfactory except if special high definition enhancement effects are desired to be incorporated. For the latter applications a fiber optics faceplate might be used. [REDACTED] has stated that they can supply such a faceplate in 9 x 9 inch size for [REDACTED] depending on quality desired.

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Some of the results obtained and photographs of displays were shown to [REDACTED] in Washington. They stated that a demonstration of the equipment in a more perfected form and using a larger display was highly desirable.

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III. Projected work for the next period.

a. Preparations will be made for a demonstration as requested. It is expected that a 10 inch tube will be used, and that 1000 ft-lambert highlight brightness can be obtained.

b. Means of obtaining multidirectional rather than unidirectional scan will be studied, and equipment built if warranted.

c. Studies of the problems of incorporating a finely focussed, registered, auxiliary detail sensing device will be continued.

IV. Financial Status.

Funds expended through September 30, 1964.

July
Aug.
Sept.

Total expended [REDACTED]

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Projected expenditures,

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Oct.

Nov.

Dec.

Jan.

Total projected



The above figures are preliminary and do not represent a final accounting.

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